Summary of the December 3rd Snowfall

Synopsis: This past weekend winter storm spread a 3 to 6 inch band of snowfall across northwest Iowa along a line from Dennison through Mason City (Fig 1). This storm originated from a powerful upper level low that tracked southward along the West Coast last week and then settled across the Desert Southwest on Friday. A smaller disturbance associated with this large-scale system moved northeast over the Midwest on Saturday December 3 (Fig 2). This disturbance created an area of upward motion in the atmosphere, which caused a large swath of precipitation to move across the region (Fig 3). There was plenty of moisture with this system, and several sites broke their daily record for rainfall. One interesting note from this event was the well-defined "bright band" that showed up on the storm total precipitation map. Bright banding occurs when snowflakes fall into a warm layer and begin to melt. This creates a coating of liquid water on the snowflakes, which in turn reflects more of the radar's energy and leads to an *overestimate* of precipitation totals. This appears as a donut-shaped ring around the radar (Fig 4).

SNOW REPORTS SORTED BY AMOUNT

THE TOTALS BELOW ARE SEPARATED BY STORM TOTAL SNOW AMOUNT AND ARE NOT NECESSARILY THE FINAL AMOUNT FOR EACH LOCATION.

INCHES	LOCATION	ST	COUNTY
6.50	5 N VAIL	IA	CRAWFORD
6.30	KANAWHA	IA	HANCOCK
6.20	4 NNW LAKE CORNELIA	IA	WRIGHT
6.10	CARROLL	IA	CARROLL
6.00	CLEAR LAKE	IA	CERRO GORDO
6.00	3 S MANNING	IA	CARROLL
6.00	FORT DODGE	IA	WEBSTER
5.50	3 E MANNING	IA	CARROLL
5.00	EMMETSBURG	IA	PALO ALTO
5.00	ROCKWELL CITY	IA	CALHOUN
4.00	SAC CITY	IA	SAC
4.00	2 NNE FOREST CITY	IA	WINNEBAGO
4.00	RUTHVEN	IA	PALO ALTO
3.90	SWEA CITY	IA	KOSSUTH
3.50	ALGONA	IA	KOSSUTH
2.80	AUDUBON	IA	AUDUBON
2.70	LAKE MILLS	IA	WINNEBAGO
2.70	ESTHERVILLE	IA	EMMET
2.50	WEBSTER CITY	IA	HAMILTON
2.30	JEFFERSON	IA	GREENE

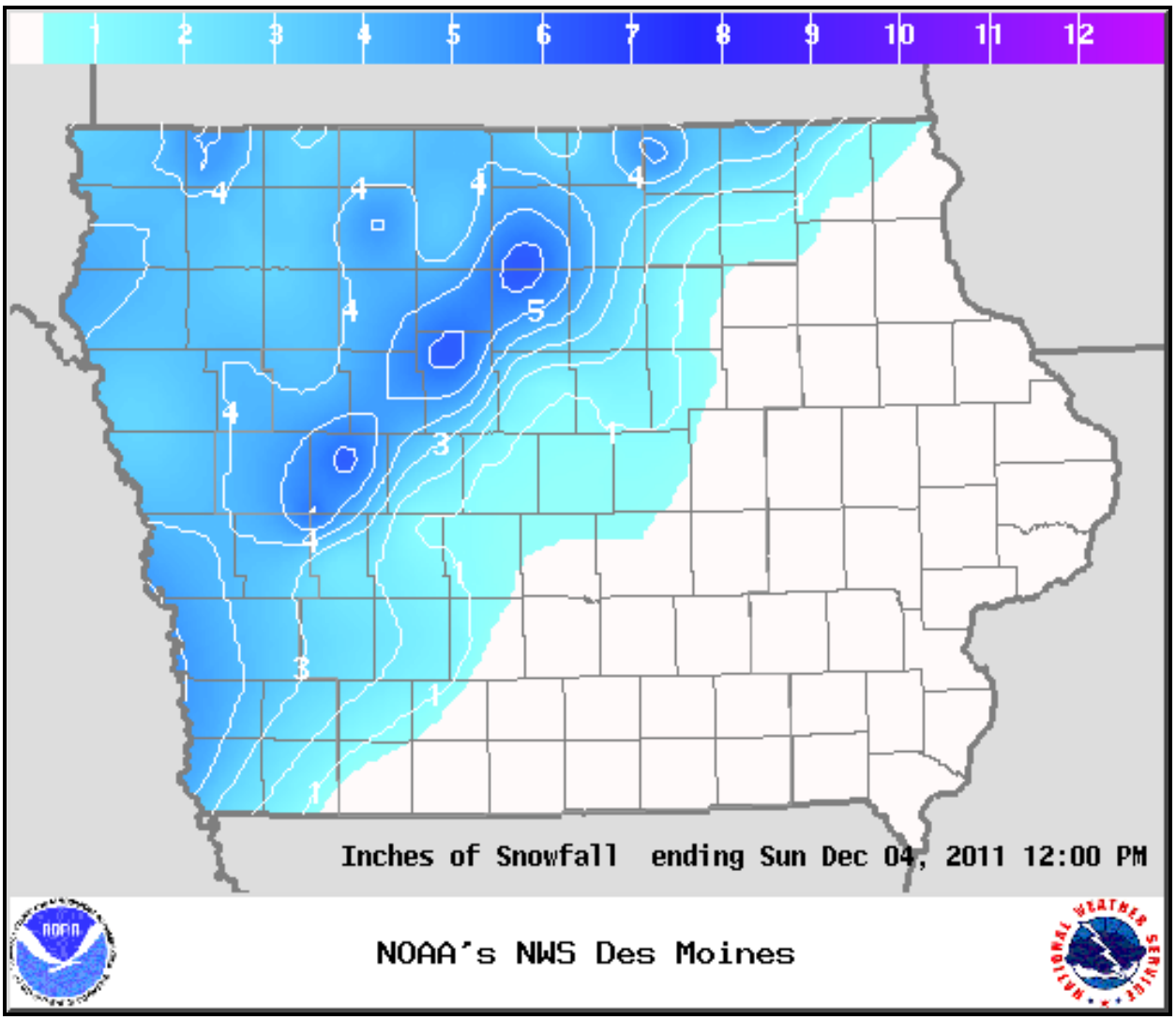

Figure 1: Storm total snowfall accumulation across northwest Iowa. Locations in southeast Iowa had rain instead of snow. This image was created from the reports listed in the table above.

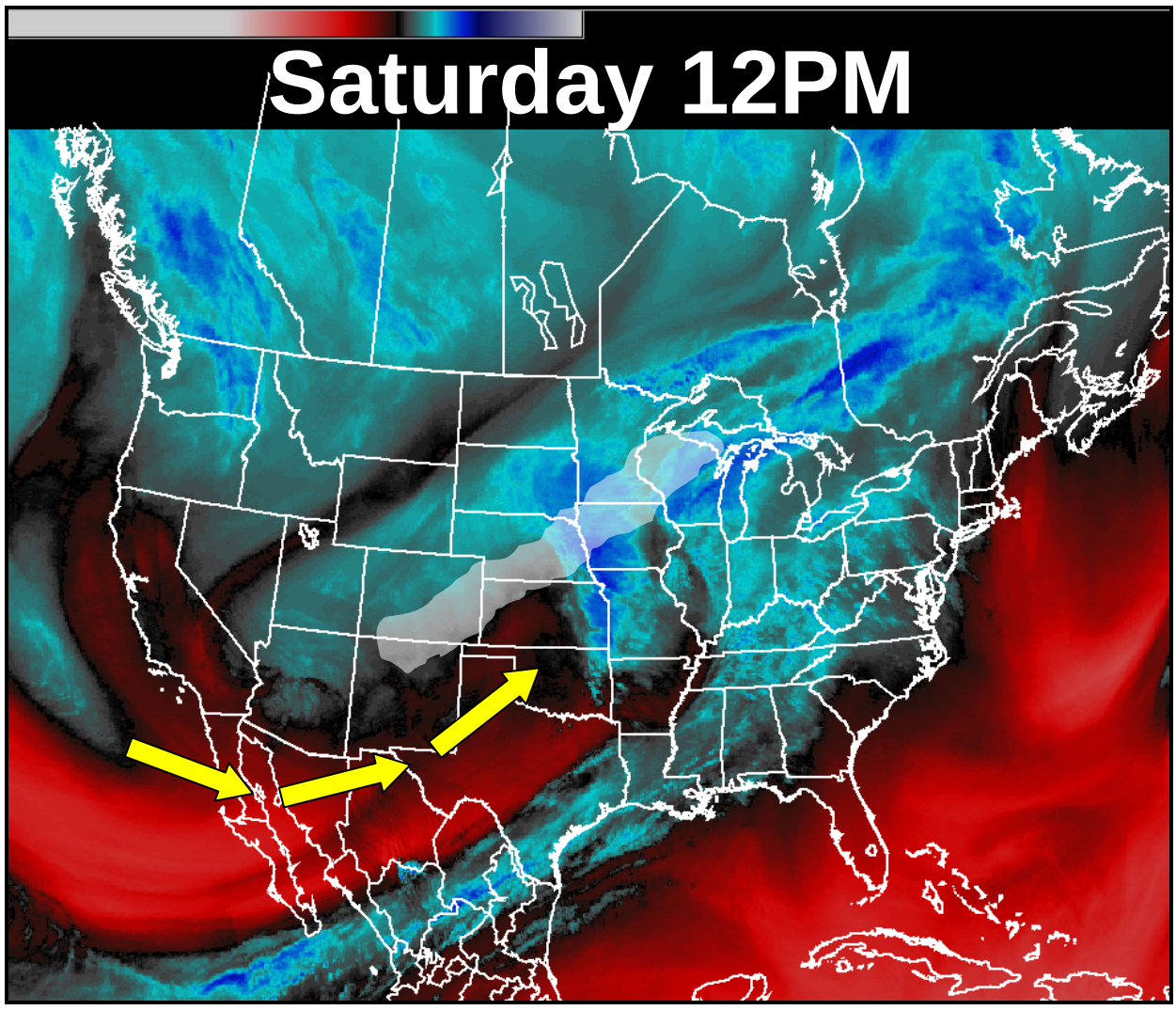

Figure 2: The figure above valid at 12PM on Saturday December 3rd shows the Water Vapor satellite image. The red colors indicate dry air, while the blue colors indicate moist rising air. At this time the rising air was over the Missouri River Valley. The yellow arrows indicate the progression of the weak upper level disturbance as it moved across the central United States over the weekend. The milky white area extending from northern New Mexico to the Upper Peninsula of Michigan represents where the snow fell.

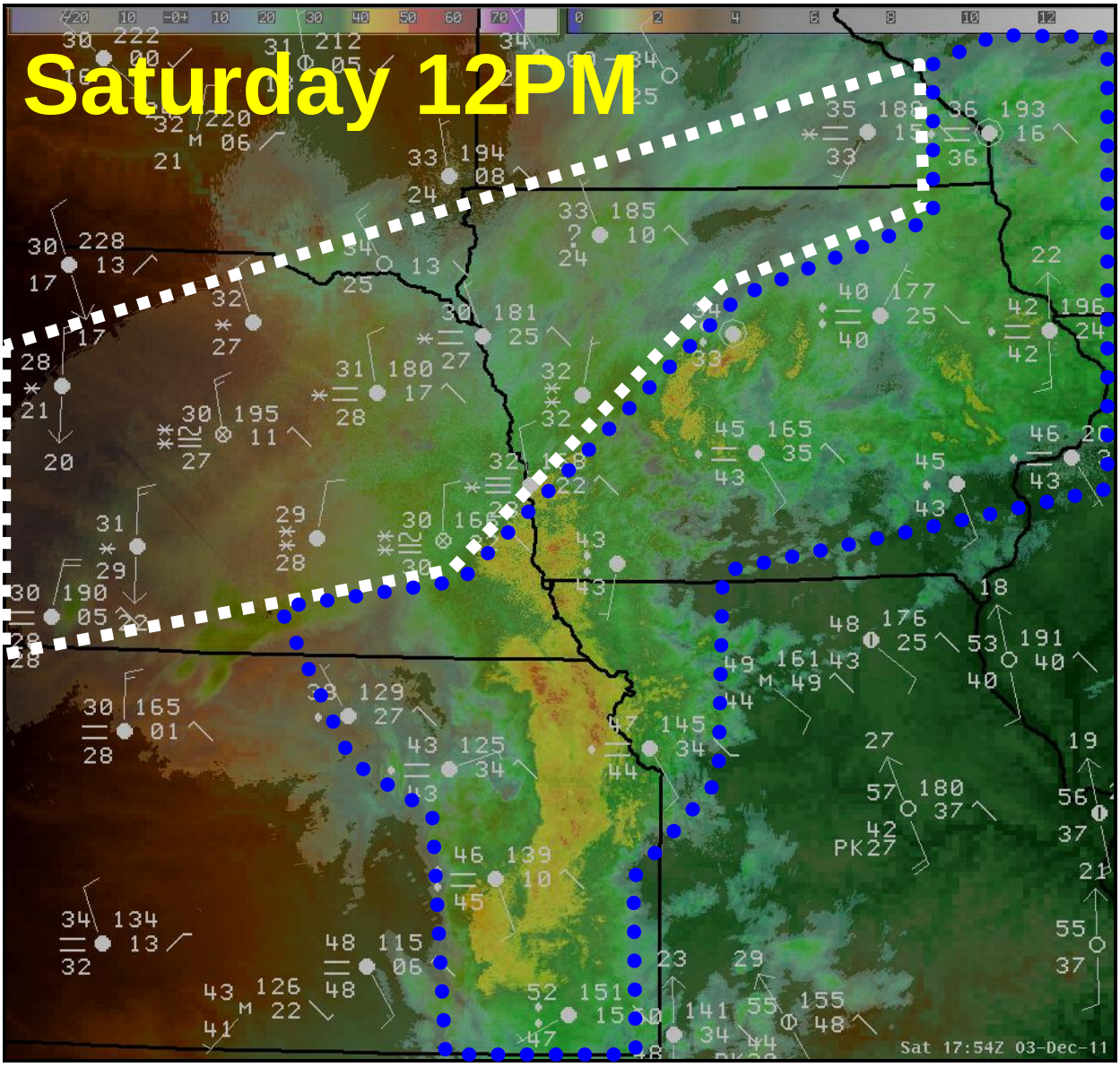

Figure 3: The radar image above is also valid at 12PM on Saturday December 3rd. Surface observations are overlaid in grey. The area where snow was falling at this time is indicated by the white outline, and the area where rain was falling is indicated by the blue outline. Many areas inside the blue shape received over an inch of rain, while locations inside the white shape received 3 to 6 inches of snow.

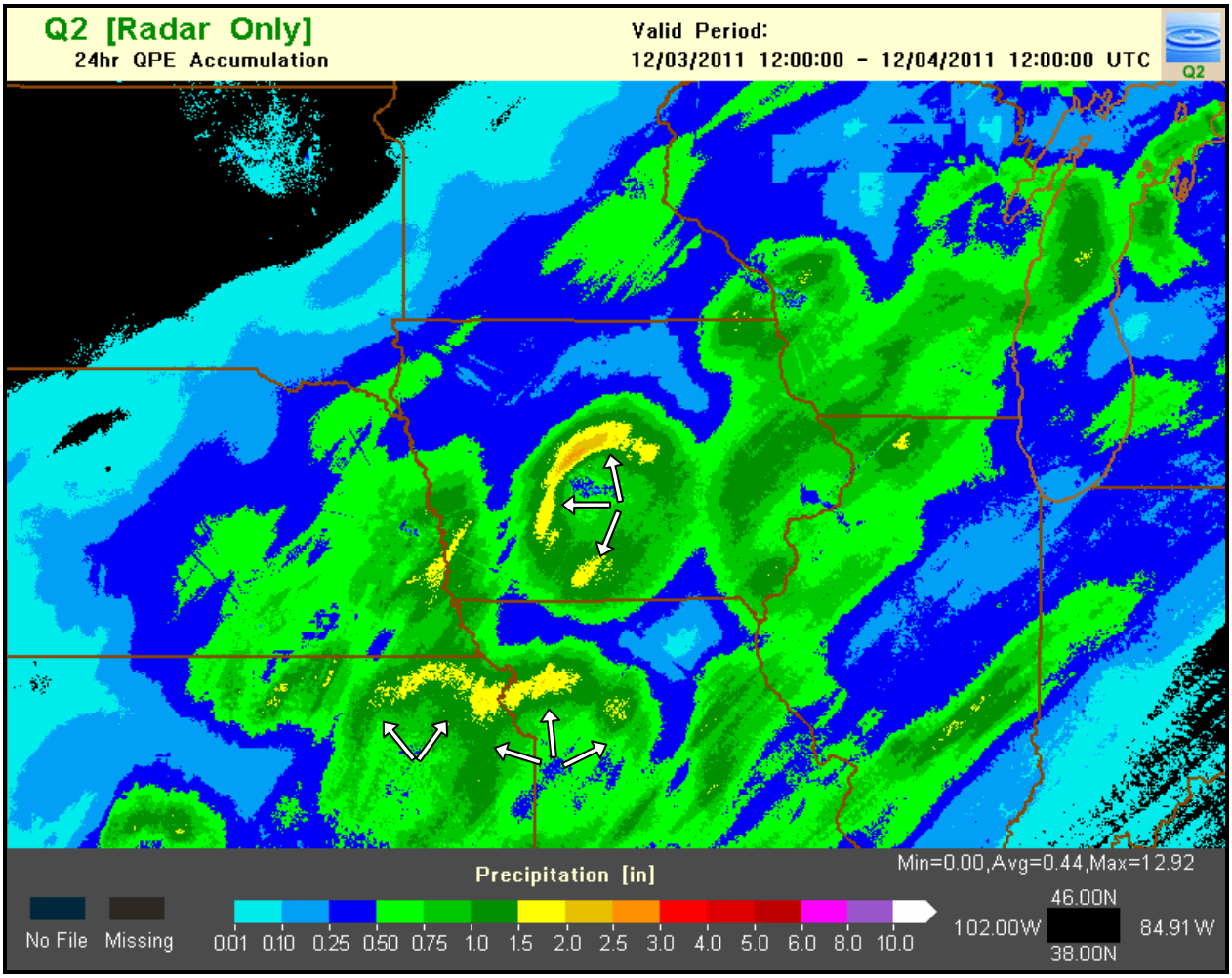

Figure 3: The image above shows a 24 hour radar estimate of total precipitation from this event. Notice the rings around the radar sites highlighted by the small white arrows. These are an artifact of "bright banding" which causes precipitation amounts to be overestimated. The image is found at http://nmq.ou.edu/